

Sub F31  
25. (New) The mutant SPE-C toxin of claim 24, wherein the amino acid substitution comprises the substitution of aspartic acid-12 to alanine, glutamic acid, asparagine, glutamine, lysine, arginine, serine, or threonine; the substitution of tyrosine-15 to phenylalanine, alanine, glycine, serine, or threonine; the substitution of tyrosine-17 to phenylalanine, alanine, glycine, glutamic acid, lysine, arginine, aspartic acid, serine, or threonine; the substitution of histidine-35 to phenylalanine, alanine, glycine, glutamic acid, lysine, arginine, aspartic acid, tyrosine, phenylalanine, serine, or threonine; the substitution of asparagine-38 to alanine, aspartic acid, glutamic acid, lysine or arginine; or substitution at more than one of these amino acids.

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26. (New) The mutant SPE-C toxin of claim 25, wherein the amino acid substitution comprises the substitution of aspartic acid-12 to alanine, the substitution of tyrosine-15 to alanine or serine, the substitution of tyrosine-17 to alanine or serine, the substitution of histidine-35 to alanine, the substitution of asparagine-38 to alanine, serine, or aspartic acid; or substitution at more than one of these amino acids.

27. (New) The mutant SPE-C toxin of claim 26, wherein the amino acid substitution comprises the substitution of tyrosine-15 to serine or alanine and of asparagine-38 to serine, alanine, or aspartic acid; the substitution of tyrosine-17 to serine or alanine and of asparagine-38 to serine, alanine, or aspartic acid; or the substitution of tyrosine-15 to alanine, histidine-35 to alanine, and asparagine-38 to aspartic acid.

28. (New) A pharmaceutical composition comprising: a mutant SPE-C toxin according to claim 24 in admixture with a physiologically acceptable carrier.

29. (New) A vaccine for protecting against at least one biological activity of wild-type SPE-C toxin comprising: an effective amount of at least one mutant SPE-C toxin according to claim 24.

30. (New) A method for protecting an animal against at least one biological activity of a wild type SPE-C toxin comprising: administering a vaccine according to claim 29 to an animal.

31. (New) A method for reducing one or more symptoms associated with toxic shock comprising: administering a vaccine according to claim 29 to an animal.

32. (New) An immunogenic composition for raising an antigen response against at least one biological activity of wild-type SPE-C comprising: an effective amount of at least one mutant SPE-C toxin according to claim 24.

33. (New) A method for raising an antigen response in an animal against at least one biological activity of a wild type SPE-C comprising: administering an immunogenic composition according to claim 32 to an animal.

34. (New) A method for reducing symptoms associated with toxic shock comprising: administering an immunogenic composition according to claim 32 to an animal.

35. (New) A mutant SPE-C toxin comprising:  
an amino acid substitution of aspartic acid-12 to alanine, glutamic acid, asparagine, glutamine, lysine, arginine, serine, or threonine;  
an amino acid substitution of tyrosine-15 to phenylalanine, alanine, glycine, serine, or threonine;  
an amino acid substitution of tyrosine-17 to phenylalanine, alanine, glycine, glutamic acid, lysine, arginine, aspartic acid, serine, or threonine  
an amino acid substitution of histidine-35 to phenylalanine, alanine, glycine, glutamic acid, lysine, arginine, aspartic acid, tyrosine, phenylalanine, serine, or threonine;  
an amino acid substitution of asparagine-38 to alanine, aspartic acid, glutamic acid, lysine or arginine; or  
substitution at more than one of these amino acids; and  
wherein the mutant is substantially nonlethal compared with a wild type SPE-C toxin.

36. (New) The mutant SPE-C toxin of claim 35, wherein the amino acid substitution comprises the substitution of aspartic acid-12 to alanine, the substitution of tyrosine-15 to alanine or serine, the substitution of tyrosine-17 to alanine or serine, the substitution of histidine-35 to alanine, the substitution of asparagine-38 to alanine, serine, or aspartic acid; or substitution at more than one of these amino acids.

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37. (New) The mutant SPE-C toxin of claim 36, wherein the amino acid substitution comprises the substitution of tyrosine-15 to serine or alanine and of asparagine-38 to serine, alanine, or aspartic acid; the substitution of tyrosine-17 to serine or alanine and of asparagine-38 to serine, alanine, or aspartic acid; or the substitution of tyrosine-15 to alanine, histidine-35 to alanine, and asparagine-38 to aspartic acid.

38. (New) A pharmaceutical composition comprising: a mutant SPE-C toxin according to claim 35 in admixture with a physiologically acceptable carrier.

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39. (New) A vaccine for protecting against at least one biological activity of wild-type SPE-C toxin comprising: an effective amount of at least one mutant SPE-C toxin according to claim 35.

40. (New) A method for protecting an animal against at least one biological activity of a wild type SPE-C toxin comprising: administering a vaccine according to claim 39 to an animal.

41. (New) A method for reducing one or more symptoms associated with toxic shock comprising: administering a vaccine according to claim 39 to an animal.

42. (New) An immunogenic composition for raising an antigen response against at least one biological activity of wild-type SPE-C comprising: an effective amount of at least one mutant SPE-C toxin according to claim 35.